



SMC

***Specs &
Standards***

Initiative

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Background

- **Several Billion \$\$ in Lost Assets During the 1990s/early 2000's**
- **Reduced Government and Contractor Mission Assurance**
 - **\$\$ and engineering resources**
- **The 90's Saw a Number of Interrelated "New Directions" for the Development of Space Systems**
 - **DoD "Acquisition Reform"**
 - **Reduced reliance on specs/standards**
 - **Deferred largely to commercial "best practices"**

• **NASA "Faster, Better, Cheaper"**

• **Acquisition Practices of the 1990s Were Inherently Flawed**

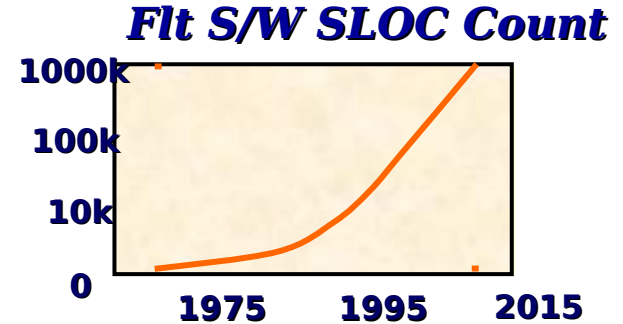
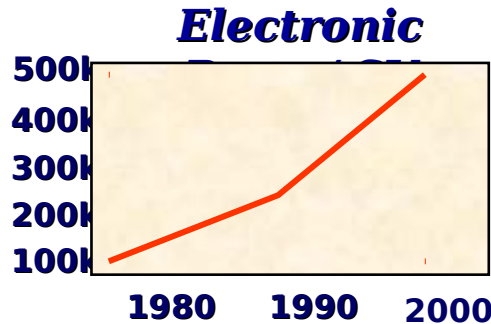
• **Commercial "Best Practices"**



Industry-Wide Technical Issues

- **System Complexity, in an Absolute Sense, Continues to Increase in Magnitude and Scope**

- **Parts**
- **Hardware**
- **Software**
- **Interfaces**



- **Increased Complexity Also Results in:**
 - **More latent defects (increased late build-cycle and orbital failures)**
 - **Greater test challenges related to changes in technology, manufacturing and materials**
 - Increasing electronic part or device complexity (e.g., ASIC, FPGA)
 - Increased use and complexity of software
 - System design and sub-system complexity
 - Ability and willingness to “test like you fly”

Satellites Today Face a Greater Challenge to Verify

Full Performance and Screen for Defects Prior to



Specs & Standards Initiative

- **Apply specs & standards as element of acquisition practices and toolset**
 - **Define technical practices and expectations by government**
 - Define the “what” - and not the “how to”
- **Establish “Select” list of space systems standards**
 - **Establish baseline set of common specs and standards**
 - **Include military and industry (e.g., AIAA, ISO) standards**
- **Establish Organizational Policy**
- **Specify critical standards in RFP**
 - **Compliance Documents**
 - **Baseline contractually**



SMC S&S Policy



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS SPACE AND MISSILE SYSTEMS CENTER (AFSPC)
LOS ANGELES, CA


JUL 11 2006

MEMORANDUM FOR SMC-ALL

FROM: SMC/CC

SUBJECT: Initial Policy on Specifications and Standards Usage at SMC

1. This policy establishes the use of specifications and standards as an integral element of SMC acquisition processes. Programs executed by SMC/AFPEO-Space shall include specifications and standards in all solicitations and shall place them on contract as compliance documents through the supplier chain, as appropriate.
2. The SMC Chief Engineer shall be responsible for defining, coordinating, maintaining, updating and reporting the master list of compliance documents. The list includes the minimum essential government, industry, professional and international specifications and standards for SMC's total portfolio of launch vehicles, space vehicles, ground systems, user equipment, missile systems, facilities and research. This policy applies to all new SMC/AFPEO-Space development, acquisition and sustainment contracts, including new contracts for legacy programs. For existing programs and contracts, the SPO's, with the SMC Chief Engineer, will assess the program, status, requirements, technical baseline and risks to generate a tailored subset of specifications and standards. This subset will be recommended to SMC/CC/AFPEO-Space for implementation. The necessary specifications and standards will be placed on contract, as part of the program's baseline and the Program Office shall enforce them. Any issues on specifications, standards or implementation that arise between SMC/EA and SPD's will be brought forward to SMC/CC/AFPEO-Space for resolution.
3. The Chief Engineer shall prepare an SMC OI to institutionalize the practice and intent of this policy.


MICHAEL A. HAMEL
Lieutenant General, USAF
Commander

- Issued by Lt.Gen. Hamel 11 July
- Establishes specifications and standards as an integral element of SMC acquisition processes
- Applies to all new development, acquisition and sustainment contracts, including new contracts for legacy programs
- Contractual compliance through the supplier chain, as appropriate
- SMC Chief Engineer (CE) responsible for master list of compliance documents
- SPO's, with CE, generate tailored set of specs and standards and recommend to PEO for implementation
- SMC/CC/AFPEO - Space resolves issues



- **65 essential documents**

- **Military, International, and Industry Standards, and Aerospace TORs**

- **Updated standards to reflect current best practices**


- **Additional updates to current document versions**

SMC Compliance List 8 Jun 2021

The image shows the title page of a technical standard document. At the top right, the identifier "AIAA-9-111-2005" is printed. Below it, the word "Standard" is prominently displayed in a large, bold, black serif font. The main title, "Qualification and Quality Requirements for Space Solar Cells," is centered below "Standard" in a smaller, bold, black sans-serif font. The background features a dark blue horizontal band at the top left. Two white rectangular boxes are present: one on the left containing the text "This document is copyrighted by the American Institute of Aeronautics and Astronautics (AIAA), 1801 Alexander Bell Drive, Reston, VA 20191-4344 USA. All rights reserved." and another on the right containing the text "This version of AIAA 9-111-2005 is provided to The Aerospace Corporation for its internal use only in recognition of its participation in the development effort for this standard. This document is not to be circulated beyond Aerospace Corporation employees (i.e., to contractors or subcontractors). Requests for copies of this document should be directed to the AIAA website. This version of AIAA 9-111-2005 is identical to that which is available directly from AIAA." At the bottom center, there is a statement about copyright distribution. In the bottom right corner, the AIAA logo is visible, consisting of a stylized circular emblem followed by the letters "AIAA" in a bold, italicized sans-serif font.

METRIC
 MIL-STD-1540C
 15 SEPTEMBER 1994
 Superseding
 MIL-STD-1540B (JULAF)
 15 OCTOBER 1982

MILITARY STANDARD
 TEST REQUIREMENTS
 FOR
 LAUNCH, UPPER-STAGE, AND SPACE VEHICLES



AMSC NIA
 FSC 1810
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Standards Technical/Functional Areas

- **Program Management**
- **Systems Engineering**
- **Risk Management**
- **Configuration Management**
- **Design Reviews**
- **Product Assurance**
- **Electrical Power**
- **Electrical Power, Batteries**
- **Electrical Power, Solar**
- **EMI / EMC**
- **Environmental Engineering**
- **Human Factors**
- **Interoperability**
- **Logistics**
- **Parts Management/Engr**
- **Ordnance**
- **Pressure Vessels**
- **Reliability**
- **Maintainability**
- **Manufacturing / Producibility**
- **Mass Properties**
- **Safety**
- **Security**
- **Software Development**
- **Structures**
- **Survivability**
- **Moving Mechanical Assemblies (MMAs)**
- **Test, Ground**
- **Test, Space**



National Security Space



Space Industrial Base Council



Collaboration Across National Security Space

Consistency NSS

Integration Space Industrial Base Council

Co-Chaired
by DoD EA
Space &
DNRO

"Bring Senior Level Attention to Space Industrial Base Issues on a Recurring Basis

and

Bring Forward 'Actionable' Recommendations Across the Full Range of Industrial Base Issues."

Specs & Stds Working Group

- Ensure ~~sound technical practices~~ applied on NSS programs and facilitate industrial supply base consistent with requirements
- Ensure NSS community takes a consistent approach in the application of specs & standards
- SMC; NSSO; NRO; Navy; NASA; MDA; NGA

Ensuring

SMC / NRO

Collaboration Mission Assurance Integration Task Force

Co-Chaired
by NRO
DDSE &
SMC/EA

"Identify and implement areas where a common SMC / NRO approach provides benefit."

Specs & Stds Working Group

- Establish a common set of preferred specifications and standards
 - Aerospace representative on NRO Standards Advisory Panel (NSAP)



Industry Standards Completed

- **7 AIAA Standards recently issued under SMC effort**
 - **Moving Mechanical Assemblies for Space and Launch Vehicles, S-114-2005**
 - **Criteria for Explosive Systems and Devices Used on Space and Launch Vehicles, S-113-2005**
 - **Qualification and Quality Requirements for Space-Qualified Solar Cells, S-111-2005**
 - **Qualification and Quality Requirements for Space-Qualified Solar Panels, S-112-2005**
 - **Space Systems-Structures Design and Test Requirements, S-110-2005**
 - **Mass Properties Controls for Space Systems, S-120-2006**
 - **Electrical Power Systems for Unmanned Spacecraft, S-122-2007**



***SMC /
Contractor***

S&S initiatives

AFS021



S&S Problem Statement

- ***No mutual understanding of contractor and SMC Specs and Standards (S&S) processes***
- **Differing requirements from different SMC customers**
- **Contractor labor intensive efforts to correlate command media (CM) to government S&S**
- **Difficulty in tracking changes in S&S**
- **Persistent contractor push back on implementation of S&S**
- **Lack of feedback on contractor comments on S&S**



Objectives/Goals

- **Review & modify current processes:**
 - **Provide documented processes which facilitate the development, modification, and implementation of the SMC Compliance S&S and Contractor command media programs**
 - **Provide documented contractor processes which facilitate understanding of relationship (verifiability) of contractor command media and SMC Compliance Standards**
 - **Improve both government and contractor S&S processes to facilitate**



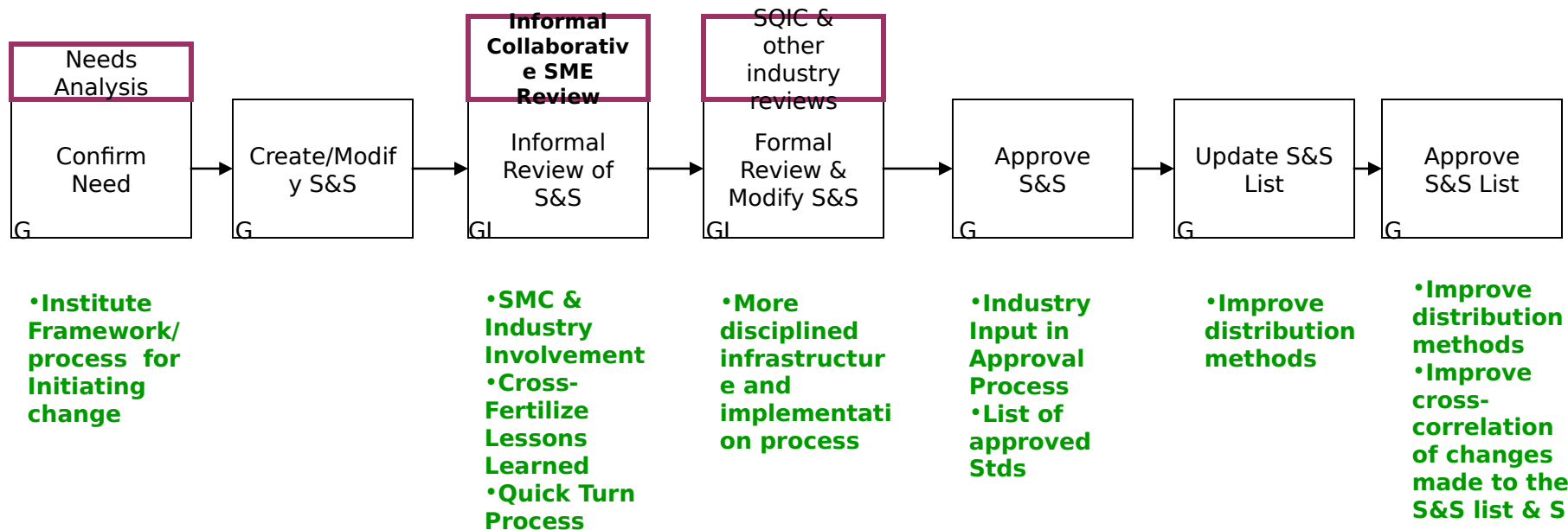
S&S Scope

- **Project Focused on SMC and Contractor Processes**
 - **Process 1: Development and Modification of S&S**
 - **Process 2: Contractor Compliance with S&S**
 - **Process 3: Pre-award S&S Tailoring Process**
- **Focused on Competitive Procurement versus Sole Source**



Current State Flow

Spec & Std Development and/or Modification Process #1



G Government Activity

I Industry Activity

■ Potential improvement opportunities identified by team

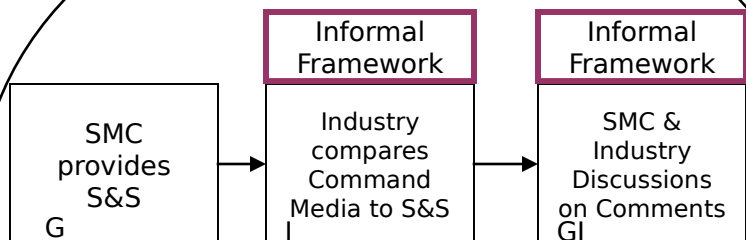
■ Process or mechanism to support identified step



S&S Contractor Compliance Process # 2

Current State Flow

Process 1



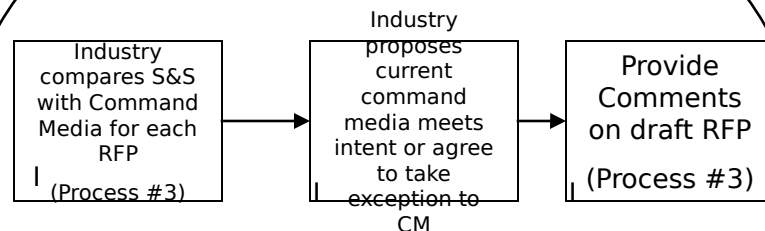
- Formal Mapping of CM to SMC S&S
- Assess if change to internal CM feasible

- SMC & Industry SME collaboration

Process 2

Doesn't exist in a formal way today

Process 3



- Industry justifies CM or proposes alternate approach

G Government Activity

I Industry Activity

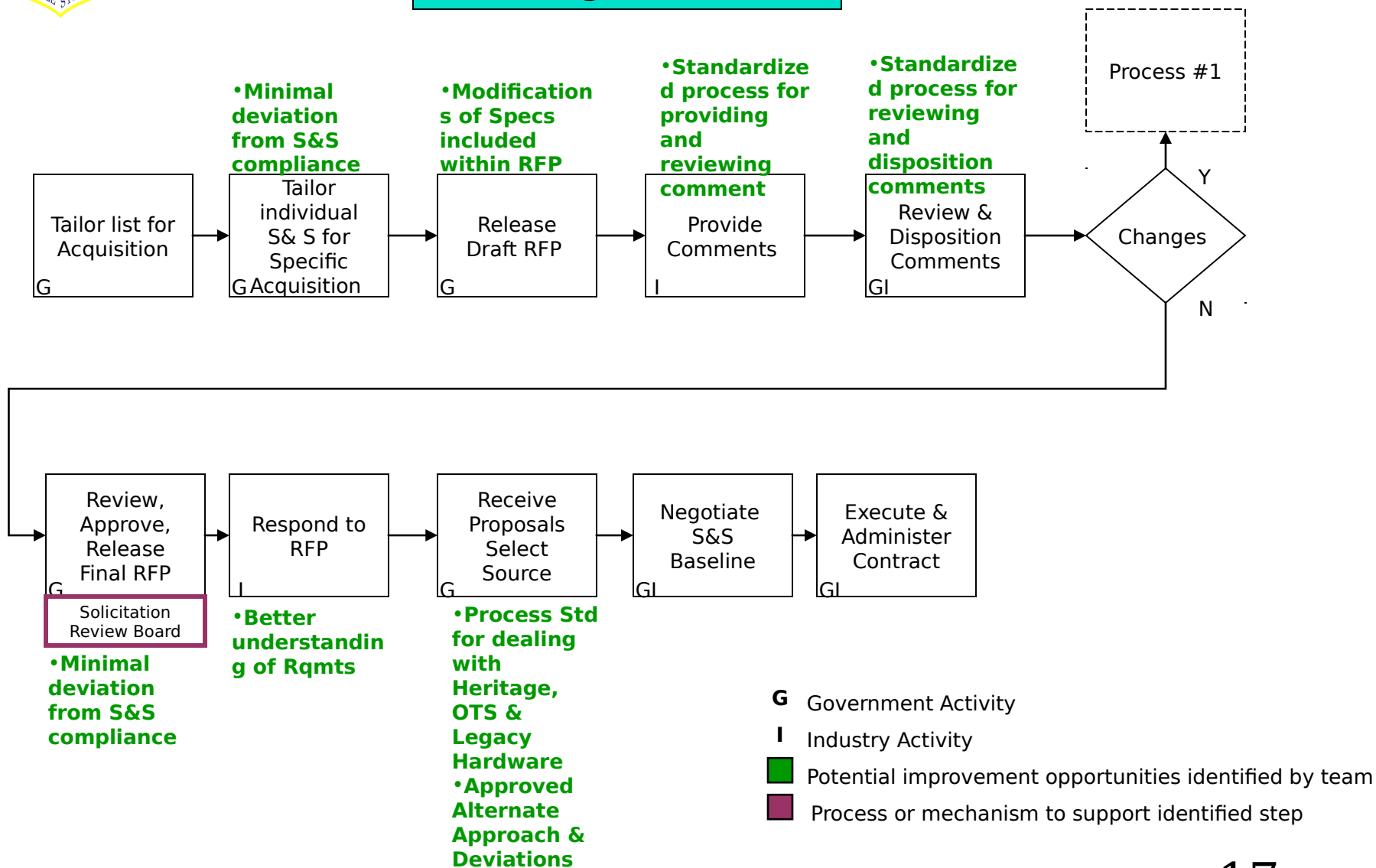
Green Box Potential improvement opportunities identified by team

Purple Box Process or mechanism to support identified step



Current State Flow

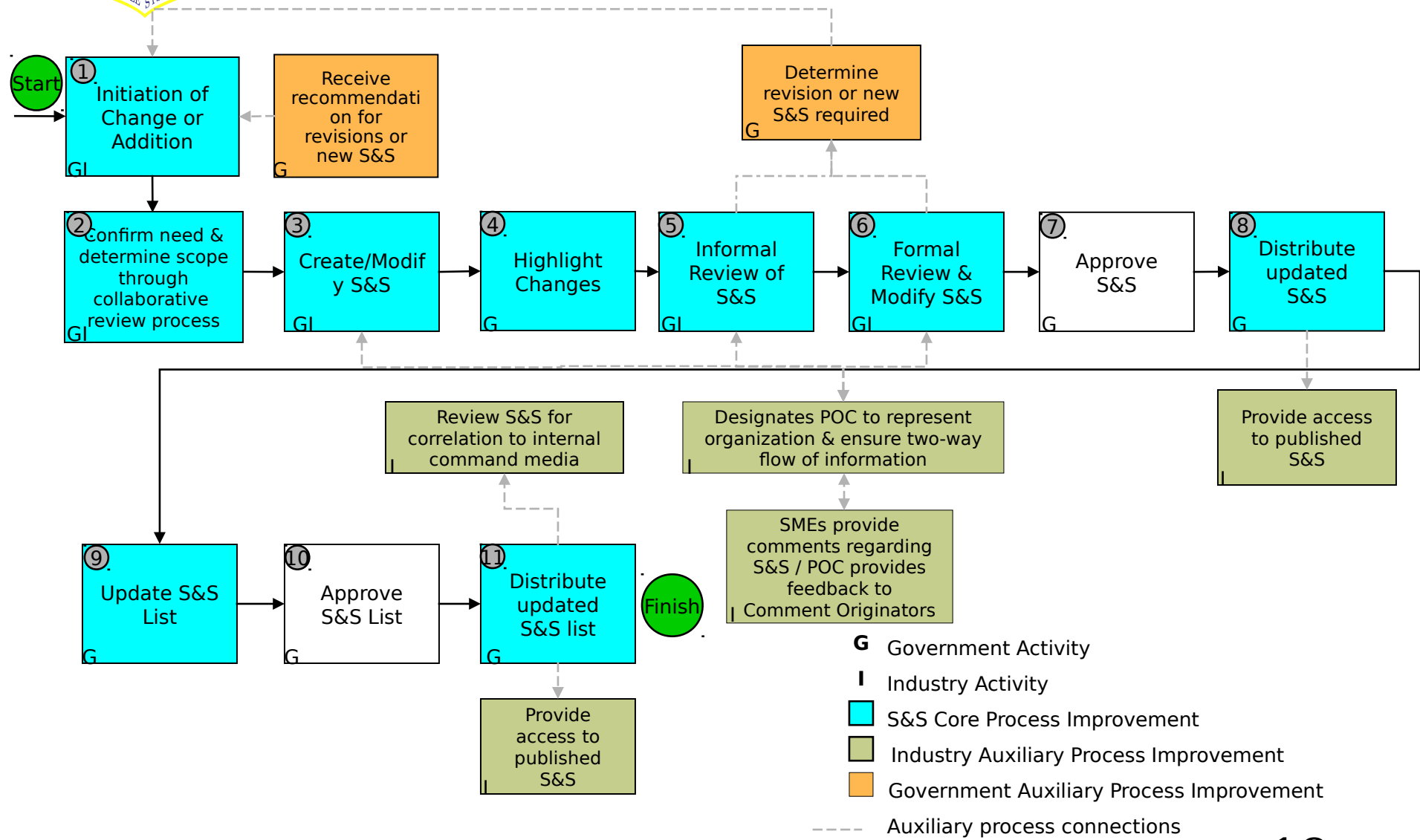
Pre-Contract Spec & Std Tailoring Process #3





Future State Flow

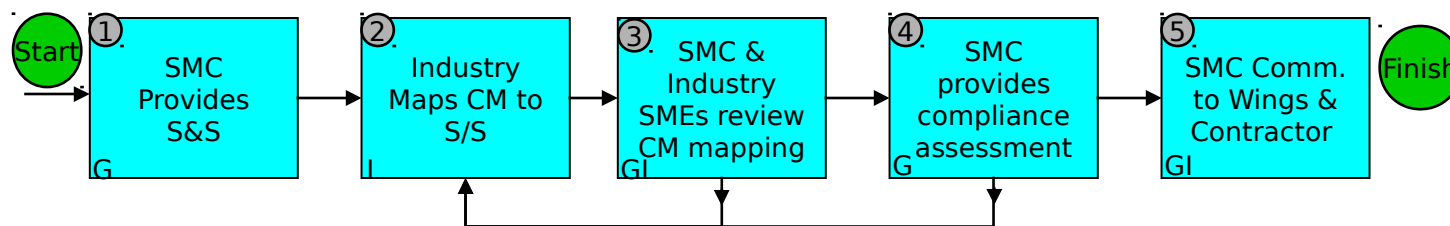
Spec & Std Development and/or Modification Process #1





Future State Flow

Contractor Compliance Process #2



G Government Activity

I Industry Activity

Cyan Box S&S Process Improvement

Green Box Industry Auxiliary Process Improvement

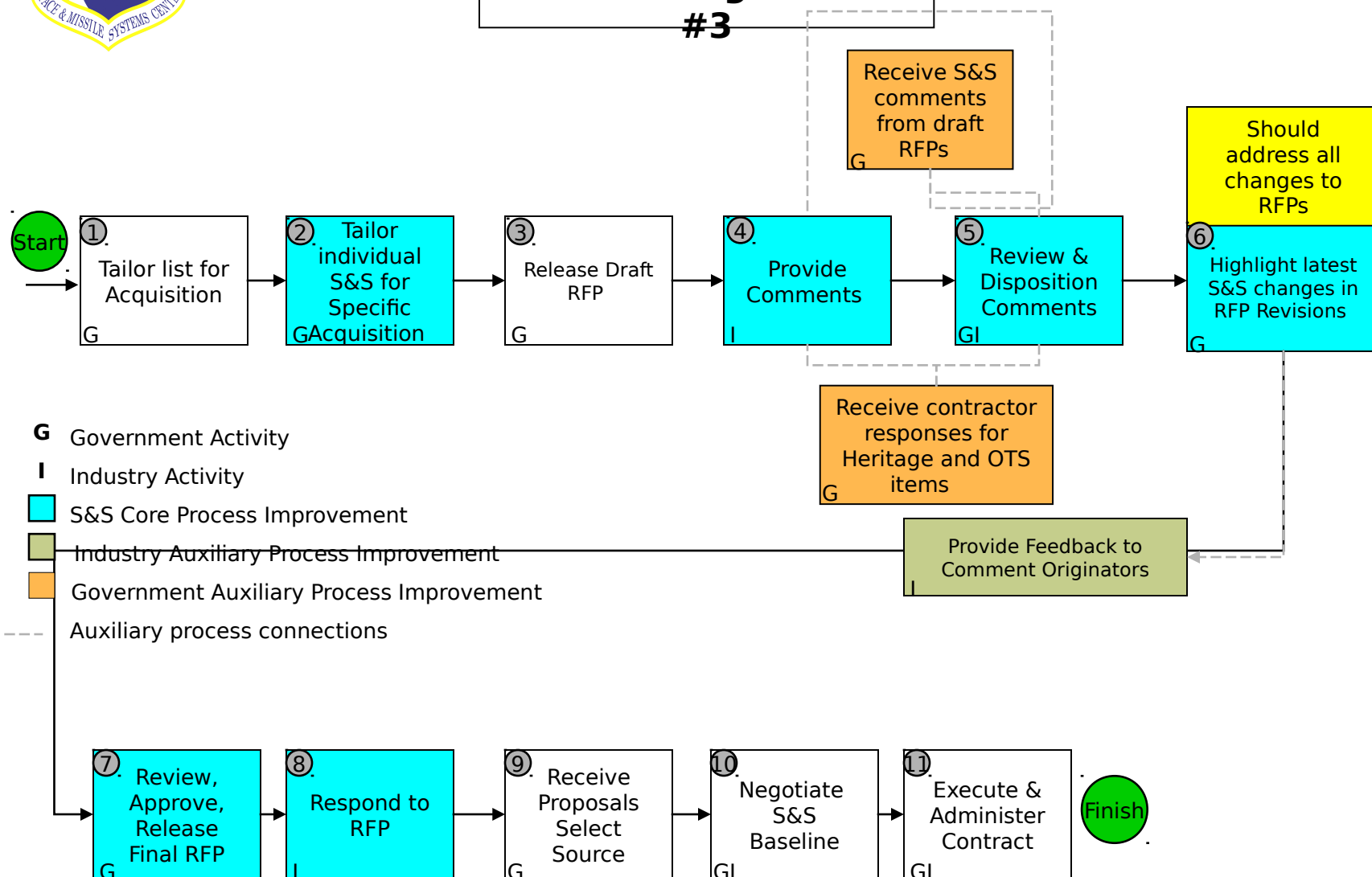
----- Auxiliary Process Connections



Future State Flow

Pre-Contract Spec & Std Tailoring Process

#3





Summary

- **S&S Infrastructure and Institutionalization on both sides critical for success**
 - **Infrastructure**
 - **Policies, organizational structure, roles responsibilities**
 - **Institutionalization**
 - **Disciplined implementation**
 - **Minimize “Waivers/Deviations”**
- **Government must implement across all programs.....and acquisition agencies**
- **Industry must implement across programs**